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# A national survey of childhood physical abuse among females in Swaziland

Matthew J. Breiding<sup>a,\*</sup>, James A. Mercy<sup>a</sup>, Jama Gulaid<sup>b</sup>, Avid Reza<sup>c</sup>, Nonhlanhla Hleta-Nkambule<sup>b</sup>

<sup>a</sup> Division of Violence Prevention, National Center for Injury Prevention and Control, Centers for Disease Control and Prevention, 4770 Buford Highway, NE, MS-F64, Atlanta, GA 30341, USA

<sup>b</sup> UNICEF, P.O. Box 1859, Mbabane, Swaziland

<sup>c</sup> Division of Emergency and Environmental Health Services, National Center for Environmental Health, Centers for Disease Control and Prevention, 4770 Buford Highway, NE, MS-F60, Atlanta, GA 30341, USA

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## KEYWORDS

Childhood physical abuse;  
Swaziland;  
Risk factors;  
Health consequences

**Abstract** *Objective:* This study describes the scope and characteristics of childhood physical abuse in a nationally representative sample of 13–24 year-old females in Swaziland. The current study also examined health consequences and risk factors of childhood physical abuse.

*Methods:* The study utilized a two-stage cluster sampling design in order to conduct the household survey. Retrospective reports of childhood physical abuse and relevant risk factors were collected from 1292 females. Bivariate and multivariate logistic regression models examined associations between childhood physical abuse and both health consequences and risk factors.

*Results:* Nearly 1 in 5 females in Swaziland has experienced childhood physical abuse in their lifetime, with nearly 1 in 20 having experienced abuse that was so severe that it required medical attention. A number of risk factors for lifetime childhood physical abuse were identified including: maternal death prior to age 13; having lived with three or more families during their childhood; and having experienced emotional abuse prior to age 13.

*Conclusions:* Preventing childhood physical abuse in Swaziland may be addressed through: promoting safe, stable, and nurturing relationships between children and their caretakers; addressing social norms that contribute to harsh physical punishment; and addressing underlying stressors associated with severe social and economic disadvantage.

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\* Corresponding author. Address: Division of Violence Prevention, National Center for Injury Prevention and Control, Centers for Disease Control and Prevention, 4770 Buford Highway, NE, Mailstop F-64, Atlanta, GA 30341-3717, USA. Tel.: +1 770 488 1396; fax: +1 770 488 4349.

E-mail address: [dvi8@cdc.gov](mailto:dvi8@cdc.gov) (M.J. Breiding).

## 1. Introduction

Childhood physical abuse has been defined as “the intentional use of physical force against a child that results in, or has the potential to result in, physical injury [1].” In contrast to other forms of physical violence, childhood physical abuse, by definition, is perpetrated by a caregiver or someone “who at the time of the maltreatment is in a permanent or temporary custodial role [1].” Childhood physical abuse is a public health problem of concern in many countries throughout the world [2]. However, there have been few national studies describing the prevalence of childhood physical abuse. In an analysis of communities within six countries, the median rate of parent-reported harsh punishment, including hitting, was 39% [3]. A national study in the United Kingdom found that the prevalence of “serious/continuous” childhood physical abuse was 7% [4].

The consequences of childhood physical abuse are significant beyond even the immediate risk of physical injury. Previous studies have shown that physical abuse has been associated with cognitive impairment and developmental delays, alcohol and drug abuse, and poor school performance [2]. Further, the mental health consequences of childhood physical abuse include anxiety, depression, and post-traumatic stress disorder [5]. A growing body of literature has demonstrated that early exposure to traumas, such as violence and abuse, can permanently alter the developing brain in ways that increase the likelihood of experiencing adult illness and premature death [6,7].

A growing body of multi-national research has shed light on factors associated with an increased risk of childhood physical abuse. A number of these factors are related to parental characteristics and family composition. For instance, physical abuse has been shown to be more likely among single mothers, particularly mothers who are young [2,8,9]. Lower levels of parental education or family income have also been associated with childhood physical abuse [8]. Previous studies have shown that larger family size and household overcrowding may be risk factors for physical abuse [2,8,9]. Other factors that have been implicated in the risk of childhood physical abuse include: a poor parent–child relationship; intimate partner violence in the home; parental stress; lack of social support; presence of an unrelated father surrogate (stepfather, mother’s boyfriend); instability of family residence; having not lived in a nuclear family or having grown up separate from biological parents; and parental substance abuse [2,5,9–13]. Prior studies have also shown an association

between self-reported physical abuse and other forms of child abuse, such as emotional and sexual abuse [14].

Despite the significant consequences resulting from childhood physical abuse, no nationally representative studies examining childhood physical abuse within Africa exist. Toward this end, the current study examines occurrence, characteristics, health consequences, and potential risk factors of childhood physical abuse in a nationally representative sample of 13–24 year-old females in Swaziland.

Due to resource constraints, this study only surveyed females. The genesis of the study was to better understand childhood sexual violence, a topic different from the focus of the current analysis. Females were sampled because prior research suggested that they are at greater risk than males for childhood sexual violence victimization [15].

## 2. Methods

### 2.1. Sampling

Survey data were collected from a nationally representative household sample of 13–24 year-old females in Swaziland in 2007. A two-stage cluster survey design was utilized to collect the sample. The Central Statistics Office of Swaziland provided a sampling frame based upon the 1997 population census, which was the most recent source of population estimates available at the time of the survey.

In the first stage of sampling 40 enumeration areas (EA) were selected from a total of 1758 EAs using probability of selection proportional to size (PPS). An EA is a geographical subdivision within Swaziland determined by the census department. In the second sampling stage a systematic sample of 48 households was selected in each EA using a random start. For this study a household was defined as a person or group of persons who may be related or unrelated, or both, who live together and share meals [16].

All 40 EAs selected were accessible to the interviewers, although in three EAs there were less than 48 households present (i.e., 47, 47, and 29 households). Approximately 68% ( $n = 1292$ ) of the 1900 households visited had an eligible female. Information was collected from 1244 of the 1292 eligible females for an overall response rate of 96.3%. In most cases non-response was due to unavailability of the selected female; only 14 (1.1%) of the selected females refused to participate.

**Table 1** Association between childhood physical abuse and relevant risk factors.

	Full model <sup>a</sup>		Reduced model	
	AOR	95% CI	AOR	95% CI
<i>Control variables</i>				
<i>Age</i>				
13–14	0.62	0.39–0.99	0.62	0.39–0.96
15–16	0.70	0.38–1.28	0.69	0.37–1.27
17–18	Ref	Ref	Ref	Ref
19–20	0.92	0.52–1.63	0.88	0.50–1.54
21–22	0.39	0.24–0.63	0.38	0.23–0.62
23–24	0.31	0.13–0.72	0.30	0.13–0.69
<i>Urbanicity</i>				
Urban (ref)	Ref	Ref	Ref	Ref
Rural	0.78	0.39–1.57	0.76	0.38–1.54
<i>SES</i>				
1st quintile	1.40	0.76–2.59	1.44	0.78–2.67
2nd quintile	0.92	0.53–1.58	0.96	0.56–1.65
3rd quintile	1.31	0.66–2.59	1.36	0.69–2.67
4th quintile	1.24	0.65–2.40	1.28	0.67–2.45
5th quintile (ref)	Ref	Ref	Ref	Ref
<i>Family/home</i>				
<i>Mother left family (before age 13)</i>				
Yes	1.11	0.70–1.76		
No	Ref	Ref		
<i>Mother education level</i>				
No formal education	1.11	0.67–1.85	1.11	0.65–1.89
Primary	0.66	0.41–1.05	0.66	0.41–1.06
Secondary/high School or tertiary	Ref	Ref	Ref	Ref
Unknown	0.55	0.32–0.94	0.60	0.37–0.96
<i>Relationship to mother</i>				
Extremely/quite close	Ref	Ref		
Somewhat or not very close	1.44	0.87–2.37		
No relationship	1.49	0.70–3.16		
<i>Death of mother (before age 13)</i>				
Yes	1.64	0.83–3.21	1.94	1.19–3.16
No	Ref	Ref	Ref	Ref
<i>No. of families lived with</i>				
1	Ref	Ref	Ref	Ref
2	1.46	0.88–2.42	1.51	0.91–2.49
3 or more	1.95	1.03–3.70	2.02	1.08–3.78
<i>Other violence witnessed or experienced</i>				
<i>Emotional abuse (prior to age 13)</i>				
Yes	1.68	1.05–2.69	1.77	1.12–2.78
No	Ref	Ref	Ref	Ref
<i>Sexual violence (prior to age 13)</i>				
Yes	1.36	0.65–2.85		
No	Ref	Ref		

Ref = reference group.

<sup>a</sup> Full Models included any variable significant in Individual Models (Adjusted Wald Chi-square,  $p < 0.10$ ).

## 2.2. Consent procedure and safety precautions

After an interviewer identified the head of household, the survey was presented as a study of the health needs of female children, without referring to the primary study topic of violence experiences. Permission to speak with the study participant was then requested of the head of household. If permission was given, a household census was taken to determine the number of eligible females in the household. When more than one female was eligible in a household, the interviewers randomly selected a single participant using the Kish Method [17]. If the selected female was not available after three separate visits, the household was skipped and not replaced, regardless of the presence of other eligible female household members. After the interviewer ensured privacy, and before consent from the participant was obtained, the participant was informed that study questions dealt with sexual experiences, HIV, and violence. Participants were assured that they could halt the survey at any time and could choose to skip questions they did not wish to answer. At the conclusion of the survey all participants were offered a list of organizations in Swaziland that provided a range of services to children and women, including services for those who had experienced violence; WHO ethics and safety guidelines for studies on violence against women were strictly followed [18,19]. The study protocol and survey was approved by the CDC Institutional Review Board. Study interviewers received extensive training, including procedures for maintaining respondent's privacy and confidentiality, and how to engage participants with sensitivity given the study topic.

## 2.3. Questionnaire development

The survey was administered in SiSwati, the primary language in Swaziland. The questionnaire was developed using standardized and previously tested survey questions [20–22]. The survey questions were also modified on the basis of interviews with local informants as well as findings from a pilot study conducted in a randomly-selected EA that was not included in the actual survey. Specifically, question modifications were made to reflect cultural-specific attitudes, behaviors, and terminology in Swaziland.

## 2.4. Dependent variable

Respondents were classified as having ever experienced childhood physical abuse if they: (a)

responded affirmatively to the following question: "Has any adult ever kicked, bitten, slapped, hit you with a fist, threatened you with a weapon, such as a knife, stick, or a gun, or thrown something at you?"; (b) identified a caregiver (father, mother, male relative, female relative, stepfather/mother's boyfriend, stepmother/father's girlfriend, teacher, principal, religious leader, community leader, manager/employer) when asked: "Can you tell me who has ever done this to you?"; and (c) indicated that they were under the age of 18 when asked the follow-up question regarding each perpetrator: "How old were you when this first happened?"

## 2.5. Abuse circumstances

Frequency information was collected by asking: "How many times did this happen?" for each perpetrator acknowledged. Finally, respondents were asked about injuries sustained as a result of physical abuse ("Have you ever been so seriously hurt during a beating that you needed medical attention, even if you did not see a doctor?").

## 2.6. Health outcomes and behaviors

Participants were asked a series of questions related to whether they had ever: felt depressed, had suicidal thoughts, attempted suicide, contracted a sexually transmitted infection, had difficulty sleeping, or used alcohol.

## 2.7. Risk factors

Participants were asked a series of questions related to hypothesized risk factors for childhood physical abuse, including the following questions about their family: parental death (prior to age 13); whether a parent had ever left the family (prior to age 13); parent education level; quality of relationship with each parent; largest number of people ever lived with at a single point in time; the number of families lived with during their childhood; and frequency of visitors in the home. Respondents were also asked whether they had ever attended school and whether they were currently attending school.

Respondents were asked a number of questions related to social support received as a child: level of support received from parents, relatives, and other adults; and level of trust and helpfulness they perceived in their neighbors. Respondents were asked questions about other forms of violence experienced such as sexual violence (experienced prior to age 13) or emotional abuse by an adult

(experienced prior to age 13). Finally, early alcohol use (prior to age 13) and the importance of religion/spirituality in their life were also assessed.

## 2.8. Sociodemographic variables

Sociodemographic variables were used as controls in regression models. These included respondent age, rural/urban residence, and socioeconomic status (SES). SES was calculated using an index of the following variables: type of toilet in the home; presence/absence of household electricity; ownership of various household appliances; use of various means of transportation; source of energy used for cooking; number of rooms in the household used for sleeping; type of flooring material; type of material used for walls; and frequency of hunger among household members.

## 2.9. Statistical analysis

SAS (version 9.1.3) was used for data management and SAS-callable SUDAAN (version 9.01) was used for analysis to accommodate sample weights and the complex sample design. Weighted percentages were calculated to generate estimates that are representative of 13–24 year-old females in Swaziland. Using logistic regression models, associations between childhood physical abuse and selected health-related conditions were examined. In addition, these same associations were examined controlling for relevant sociodemographic variables (age, community setting, socioeconomic status, and orphan status), as well as a history of emotional abuse and sexual violence prior to age 13. In Swaziland, orphan status is defined as the death of at least one biological parent before 18 years of age [23].

For the risk factor analyses, bivariate logistic regression models were initially used to examine each risk factor in relation to childhood physical abuse. Individual risk factors associated with childhood physical abuse at  $p < 0.10$  (Adjusted Wald Chi-square) were included, along with control variables, in a multivariate logistic regression model predicting childhood physical abuse. In order to create a final reduced model, individual risk factors were removed using a backward elimination procedure until all risk factors were significant at  $p < 0.10$  (Adjusted Wald Chi-square). Interactions between respondent age and other variables in the final model were examined. Because the study examined victimization prior to age 18 in a population that included 13–17 year-old females, there was particular concern about the influence of respondent age on victimization status. However,

none of the interaction terms were significant, so they were removed from the model.

## 3. Results

### 3.1. Occurrence of lifetime childhood physical abuse

Approximately 19.7% (95% Confidence Interval [CI] = 16.8–23.0) of females reported experiencing childhood physical abuse during their lifetime. Those in the 17–18 year old age group reported the highest levels of lifetime childhood physical abuse (26.6%, 95% CI = 20.3–34.1), whereas those in the 23–24 year old age group reported the lowest levels of lifetime abuse (11.8%, 95% CI = 6.6–20.1). Among females living in urban communities, 23.9% (95% CI = 15.4–35.2) experienced lifetime childhood physical abuse, compared with 19.0% (95% CI = 16.1–22.2) of females living in rural communities. Approximately 4.9% (95% CI = 3.7–6.5) of females experienced an injury requiring medical attention as a consequence of childhood physical abuse.

### 3.2. Relationship to caregivers and frequency of childhood physical abuse

Approximately 93.5% (95% CI = 87.6–96.7) of victims reported experiencing physical abuse by one caregiver while 5.9% (95% CI = 3.0–11.3) reported experiencing physical abuse by two caregivers. The caregivers who were most frequently reported as having perpetrated physical abuse were parents with 23.4% (95% CI = 17.4–30.7) being mothers and 22.9% (95% CI = 16.3–31.3) being fathers. Other caregivers likely to perpetrate childhood physical abuse include: other male relatives, not including brothers (20.8%; 95% CI = 14.3–29.4); other female relatives, not including sisters (17.2%; 95% CI = 12.1–23.9); schoolteachers or principals (8.8%; 95% CI = 5.1–14.8); and stepparents or parent's boyfriend/girlfriend (5.3%; 95% CI = 3.0–9.1). The frequency of abuse experienced by females was: "once" among 28.1% (95% CI = 21.9–35.2) of abusive caregivers; "a few times" among 31.1% (95% CI = 25.3–37.5) of abusive caregivers; and "many times" among 40.8% (95% CI = 33.2–49.0) of abusive caregivers.

### 3.3. Risk factors associated with childhood physical abuse

Childhood physical abuse was associated with a number of risk factors in bivariate logistic regression models. All risk factors associated with child-

hood physical abuse in individual models (at  $p < 0.10$ ) were included in the full model, along with control variables. After eliminating non-significant risk factors from the full model, there remained a number of factors associated with childhood physical abuse in the reduced model. Specifically, in comparison with the 17–18 year old age group, the 13–14 year old age group, the 21–22 year old age group, and the 23–24 year old age group were significantly less likely to report childhood physical abuse (Table 1). In addition, females were significantly more likely to report childhood physical abuse if their mother had died prior to age 13, if they had lived with three or more families in their lifetime, or if they had experienced emotional abuse prior to age 13.

### 3.4. Association between childhood physical abuse and health outcomes

After controlling for age, community setting, SES, and orphan status, as well as the experience of emotional and sexual abuse prior to age 13, childhood physical abuse was significantly associated with a greater likelihood of ever: feeling depressed; experiencing suicidal ideation; attempting suicide; having a sexually transmitted infection; having difficulty sleeping; and alcohol usage (Table 2).

## 4. Discussion

The results of this study indicate that nearly 1 in 5 females in Swaziland experienced childhood physical abuse, and nearly 1 in 20 experienced abuse that was so severe that it required medical attention. The most common perpetrators were mothers, fathers, other female relatives, and other

male relatives. Childhood physical abuse was associated with a range of health problems including: feeling depressed, suicidal ideation, suicide attempts, having an STD, difficulty sleeping, and alcohol usage. A number of risk factors emerged suggesting increased risk of childhood physical abuse among females who: experienced the death of their mother prior to age 13, lived with three or more families during their childhood, or experienced emotional abuse prior to age 13.

Parents were the most common types of perpetrators of physical abuse, consistent with their primary caretaking role. However, less than half of perpetrators were parents and they represent a significantly smaller proportion of perpetrators than in other studies [4], perhaps owing to the significant numbers of orphaned children in Swaziland. Also notable is that nearly 1 in 10 perpetrators were teachers or principals, reflecting a level of acceptance in Swaziland of corporal punishment in schools. Guidelines for teachers in Swaziland spell out what is considered acceptable corporal punishment, including the maximum number of strokes, the size of the cane to be used, the person with authority to administer the punishment, and the part of the body to receive the strokes (Personal Communication, J. Gulaid).

Although a number of risk factors identified in this survey have been previously shown as risk factors in the literature, it is possible that these findings owe largely to the immense difficulties faced by Swaziland as a result of the burden of HIV. In 2007 Swaziland had the highest prevalence of HIV in the world (25.9%) among 15–49 year old persons [24]. Consequently, between 1992 and 2007 the life expectancy at birth in Swaziland decreased from 60.6 to 45.3 years [25]. This, in turn, has resulted in a large number of orphans as evidenced by the

**Table 2** Association between experience of child physical abuse and selected health conditions.

	No history of physical abuse prior to age 18 ( $n = 245$ )		History of physical abuse prior to age 18		Crude odds ratio (95% CI)	Adjusted odds ratio <sup>b</sup> (95% CI)
	$n$	Weighted frequency (%)	$n$	Weighted frequency (%)		
Felt depressed	184	76.5	658	65.3	1.72 (1.20–2.47)	1.93 (1.30–2.85)
Suicidal ideation	67	25.1	174	15.8	1.79 (1.04–3.09)	1.76 (1.06–2.94)
Attempted suicide	21	7.4	34	2.9	2.65 (1.36–5.17)	2.33 (1.24–4.38)
Sexually transmitted disease	21	9.7	39	3.7	2.81 (1.38–5.70)	3.46 (1.49–8.04)
Difficulty in sleeping	117	46.7	356	34.7	1.65 (1.05–2.62)	1.67 (1.06–2.64)
Alcohol use <sup>a</sup>	35	15.3	94	9.0	1.83 (1.01–3.32)	1.93 (1.05–3.53)

<sup>a</sup> Ever drink alcohol other than a few sips.

<sup>b</sup> Adjusted for age, community setting, socioeconomic status, orphan status, history of emotional abuse (prior to age 13), and history of sexual violence (prior to age 13).

18.4% of 13–24 year old females who had experienced the death of their mother. These factors likely play a role in the significant association found between childhood physical abuse and having experienced maternal death prior to age 13. Further, the high rate of maternal (and paternal) death has certainly resulted in the breakdown of family structures, and this is likely reflected in the association between childhood physical abuse and having lived with three or more families during childhood.

Recent review articles have identified several primary prevention programs that have shown promise in preventing childhood physical abuse. These include home visitation programs, such as the Nurse–Family Partnership, as well as parent education programs, such as Triple P-Positive Parenting Program. However, one recent review of child abuse prevention review articles found that of nearly 300 publications examined, only 1% were tested in a middle-income country with none being tested in a low-income country [26,27]. The authors conclude that it is unclear whether any of these programs would be similarly effective in middle- and low-income countries owing to differences in culture, risk factors, and resources [26]. Further, any programs tested in high-income countries would need significant adaptation for use in middle- and low-income countries and that assumes that resources are available for such programs [26].

Despite the limited evidence base for the prevention of child physical abuse in low-income countries like Swaziland, this study and the experience of other countries suggest a number of broad strategies that may yield positive benefits. First, it should be recognized that continued efforts to stem the HIV epidemic in Swaziland will be important for preventing the early death of mothers (and fathers) and, thus, also likely reduce the risk of violence against children. HIV prevention, therefore, may be critical for reducing the vulnerability of children to violence by way of better maintaining stable families. Second, although the evidence base for prevention of violence against children has been built largely on the experiences of high-income countries, this evidence base may be very useful for developing approaches that are appropriate for low-resourced environments. The evidence base for the prevention of child maltreatment points to the importance of building safe, stable, and nurturing relationships between children and their caregivers [28]. The most basic approach to facilitating these positive relationships involves teaching parents safe and nurturing child-rearing and management skills. Providing adequate social support to parents and families may also help families buffer the contribution of stress to physical

violence. In particular, efforts to strengthen the support system for children who have a sick or deceased parent might be particularly helpful in preventing child physical abuse. These approaches would have to be adapted to the cultural context of Swaziland, but the common element of creating environments that are supportive of safe, stable, and nurturing relations between children and caregivers may have universal applicability. Third, addressing social norms that contribute to harsh physical discipline by parents and other caregivers may be useful as well. Along these lines, policies that ban or severely limit corporal punishment in schools have been implemented in 118 countries, while 30 countries have laws banning corporal punishment in the home as well [29]. The potential effectiveness of these policies is attenuated by the degree to which they are enforced, but evidence is mounting that they can be an important component of efforts to reduce the physical abuse of children [30]. Finally, programs and policies designed to reduce stress associated with social and economic disadvantage may also help in reducing physical violence.

This study has a number of strengths. The data in this study are derived from what the researchers believe to be the first nationally representative study of childhood physical abuse in Africa. Secondly, the survey had an exceptionally high response rate among eligible participants. Finally, despite concerns that a household study could miss many females who were currently attending school, a significant number of currently enrolled students participated through the efforts of survey interviewers to reach students after school hours.

The findings of the study are subject to several limitations. First, given the cross-sectional nature of the study, temporality was not ascertained, and the associations found do not necessarily reflect a causal relationship. Secondly, owing to the focus on females in this study, factors related to the victimization of males were not able to be identified. Thirdly, the outcome variable assessed physical abuse using only a single question that grouped many types of physical abuse. Some of the more severe forms of physical abuse (e.g. burning, being hit with a weapon) were not specifically assessed and this likely led to an underestimate of the occurrence of childhood physical abuse. Fourthly, it is difficult to interpret the lower likelihood of child physical abuse among those 21–24 year old subjects, compared with those in the 17–18 year-old age group. While it could indicate an increase in child physical abuse across that age range, it more likely reflects a degree of recall bias, with victims believing incidents to have oc-



curred closer in time than they did in actuality (i.e. telescoping). Furthermore, the ability to recall physical abuse may be associated with a victim's current state of mental health, and this may have influenced the associations found between childhood physical abuse and depression and suicide risk. Fifthly, while the current study examined risk factors for victimization, these point only to those who might be most vulnerable to experiencing childhood physical abuse. In order to design efforts aimed at primary prevention, future studies should examine perpetrators of physical abuse against children, and the factors that predict this type of aggression. Finally, owing to the significant variation in methods and prevalence estimates between studies of this topic, it is difficult to make comparisons with regard to the prevalence of childhood physical abuse.

## 5. Conclusion

Despite these limitations, this study was able to demonstrate the scope of the problem of childhood physical abuse among females in Swaziland, both in terms of prevalence and associated health consequences. In addition, this study was able to identify a number of factors that likely play a role in whether female children experience physical abuse. The findings presented here will aid those dedicated to the protection of children in the development of more targeted interventions.

## Conflict of interest statement

None declared.

## Disclaimer

The findings and conclusions in this report are those of the authors and do not necessarily represent the official position of the Centers for Disease Control and Prevention or the United Nations Children's Fund (UNICEF).

## Ethics information

This study was carried out in accordance with The Code of the World Medical Association (Declaration of Helsinki). In addition, the administration of this study complied with the current laws of Swaziland. The study protocol was approved by the Institutional Review Board of the Centers for Disease Control and Prevention. There was no Institutional Review Board within Swaziland at the time in which the survey was conducted. However, key stakeholders in Swaziland

provided input in the development of the survey protocol and instrument. These stakeholders included: (1) relevant ministries such as the Ministry of Education, the Ministry of Health and Social Welfare, and the Ministry of Justice; (2) service providers such as the Swaziland Action Group Against Abuse (SWAGAA), Save the Children, the Social Welfare Department housed in the Ministry of Health and Social Welfare, and the Royal Swazi Police; and (3) other experts on violence against children, including key informants in Swaziland as well as violence researchers in South Africa. Meetings with key stakeholders and informants helped to inform the survey instrument and procedures, taking into consideration the local cultural context. In addition, these discussions helped to foster ownership of the survey and build local capacity to address the problem of violence against children. Finally, we administered a pilot test in one village prior to the larger data collection effort. This pilot test provided further information about how to modify the survey and protocol so as to be culturally appropriate for administration in Swaziland.

## Informed consent

All participants were provided with information regarding their participation in the study and were required to provide consent in order to participate. More information regarding informed consent is provided in the Methods section of the manuscript.

## Author contributions

M.J.B., A.R., J.G., and J.A.M. designed the study. Data collection was overseen by A.R., J.G., and N.H. M.J.B. led the statistical analysis. M.J.B., A.R., J.G., J.A.M., and N.H. participated in drafting the article, and have provided approval of the final manuscript.

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